Progress on the Draft Report: Consideration of Geochemical Issues in Ground Water Restoration at Uranium *In-Situ* Leach Mining Facilities

NMA/NRC Uranium Recovery Workshop

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Acknowledgments

- This project is being conducted by U.S. Geological Survey (USGS) under an NRC contract
  - The principal investigator is James Davis, USGS
- The Office of Research (RES), NRC
- The Office of Nuclear Material Safety and Safeguards (NMSS), NRC

Agenda

- Background
- Scope of Work
- Status & Progress
- Future Activities

Background

- 10 CFR Part 40, Appendix A, Criterion 5
  - Ground water protection standards
- NUREG-1569, Section 6.1
  - Guidance: ground water quality restoration
- 10 CFR Part 40, Appendix A, Criterion 9
  - Financial surety for decontamination and decommissioning
- NUREG-1569, Section 6.5
  - Guidance: financial assurance

Background

- Activities to be covered by surety include ground water restoration among others.
- One major cost of ground water restoration is related to the volume of water (i.e., pore volumes) pumped or recirculated through the ore zone.
- A proven pore volume estimation methodology (PVEM) is not available to the NRC.
- Few geochemical models of ground water restoration process exist in the literature.

Scope of Work

- NRC staff identified the need to develop a project addressing PVEM.
- Serve as guidance to review pore volume calculations and surety requirements.
- Staff from RES and NMSS started to develop a preliminary PVEM.
  - The work didn't include geochemical processes.
- NMSS, through RES, contracted USGS to provide the geochemical information.

Scope of Work

- The USGS project was divided into the following phases:
  - Assess technical issues and developed approaches
  - Integrate the geochemical approach into PVEM
    - The preliminary PVEM NRC staff developed is being used as a baseline
  - Test integrated methodology using field data

Status & Progress

- USGS provided the 1st draft of the report in July 2003. The purpose of the report :
  - Geochemistry relevant to ground water quality restoration
  - Focused on U, Se, As, V
- PHREEQC computer code
- Ground water restoration effort
  - Groundwater sweep
  - Reverse osmosis with re-injection
- Database to test integrated methodology: Ruth ISL facility

Status & Progress

- Topics covered in the draft report include:
  - Geochemical characteristics of U roll front deposits (for WY Basins, TX Coastal plains)
  - Aqueous geochemical reactions during ISL operations
  - Ground water restoration & modeling
    - Reactive transport simulations
    - 1 pore volume $\rightarrow$ ground water sweep
    - Additional pore volumes $\rightarrow$ reverse osmosis
    - Aquifer parameters modified
    - Two simulations $\rightarrow$ adding H_2S

Status & Progress

- NRC staff reviewed the draft report and provided comments to USGS.
  - Preferable to carry out more pore volumes
  - Additional studies of the groundwater stabilization phase

Future Activities

- USGS is addressing NRC comments
- A report will be issued in July 2004
- Potential briefing at a public meeting